REMARKS

Claims 8-13 are pending. Claims 8-10 are amended. Claims 11-13 are new.

Proposed Corrected Drawings in view of the written description

The Applicants now indicate "Prior Art" as the legend to FIG.1 as recommended by the Examiner.

The corrected drawings presented herewith further show thick and thin lines as described in the specification.

Reference number 28 is now deleted from FIG.2.

Reference number 23 is now deleted from FIG.2. The Applicants respectfully point out that reference number 23 with regard to FIG.3 is used to describe a liquid coolant thermocontroller in the specification at page 13, lines 10-15.

Each of the line conduits (pipe lines) referred to in the specification as "line 1", "line 2", etc., and that were previously indicated in FIG.2 and FIG.3 as "L1", "L2", etc., are now indicated in the figures as "line 1", "line 2", etc., to directly correspond with the written description. Accordingly, the Applicants respectfully submit that, in view of these amendments to the drawings, all specified features of the claimed invention are now clear in view of the written description. The Examiner is respectfully requested to withdraw the objections to the drawings and specification.

Claim Rejections under 35 USC §112 Paragraph 1

The Applicants have amended claims 8-10 to fully address the issues raised by the Examiner. The Applicants wish to begin by pointing out that the Applicants have elaborately studied the process for producing acrylic acid and consequently found that by substituting liquid for steam[2] (which has been supplied as the heat source in the prior art for gasification) while recovering latent heat of the liquefied propylene and/or propane and thereby preparing the chilled coolant, it is now possible to allow the reactant gas to be supplied stably and, at the same time, enable the total system for producing acrylic acid to be stabilized drastically, reducing

[2] With reference to FIG.1, it has been heretofore customary to supply steam 17 controlled by the pressure controller 24 to the evaporator 3 for the purpose of utilizing the high energy of the steam 17, thereby gasifying liquefied propylene.

unwanted polymerization and subsequent clogging of the system. Moreover, the external power required to operate the apparatus of the present invention is significantly reduced because of the chilling of the liquid during gasification and subsequent use as a coolant to the system. See, e.g., Specification page 5, line 32 - page 6, line 11.

The Applicants have amended claims 8-10 to address relationships between fundamental elements of the apparatus of the invention. The present invention employs an evaporator (indicated as element 3 in FIG.2) as a container wherein liquefied propylene and/or propane is gasified. The Examiner is kindly referred to the Specification, for example, at page 28 line 15 - page 30, line 10. Particularly, liquefied propylene (and/or propane) and "liquid coolant" are supplied to the evaporator wherein heat exchange occurs between these liquids resulting in (1) propylene and/or propane gasification, and (2) simultaneous chilling of the liquid coolant. The chilled liquid coolant is then circulated to heat exchangers on the apparatus for cooling the system. Heat exchangers, as specified by the Applicants with reference to FIG.2, also include but are not limited to the solvent cooler 8 attached to the acrylic acid absorbing column 5, the circulation cooler attached to the acrylic acid absorbing column, the condenser 10 attached to the solvent separating column 6 and the condenser 11 attached to the refining column 7. Specification, page 14, lines 4-13. The liquid coolant is then recycled to the evaporator wherein gasification of liquefied propylene and/or propane - as well as chilling of the liquid coolant - occurs. According to this invention, since the latent heat is recovered by liquid, the gasification of propylene and/or propane can be effected stably and the supply of the reactor with propylene can be attained stably as compared with the conventional method utilizing steam. At the same time, by using the chilled liquid in the heat exchangers in the process of acrylic acid production, it is made possible to decrease the energy consumption for cooling of the highly exothermic reactions.

In view of the amendments to the claims and the remarks presented, the Applicants respectfully request the Examiner to withdraw the rejections under 35 USC §112 Paragraph 1.

Claim Rejections under 35 USC §103(a)

The Examiner has alleged that the subject matter of claims 8-10 is obvious in view of admitted prior art (i.e., Applicants' FIG.1) and the disclosure of Oswalt, *et al.*, U.S. Patent No. 4,769,998 ('998).

Oswalt, *et al.*,'998

The '998 disclosure does not teach or suggest a means for cooling fluid by recovering latent heat, for example, from liquefied propylene and/or propane. In sharp contrast, the subject matter of the '998 disclosure is a conventional mechanical refrigerating system which employs refrigerant coils to cool a reservoir of liquid. The "precision controlled water chiller" is intended for cooling manufacturing equipment. Particularly the Oswalt *et al.*, disclosure is directed to ameliorating temperature fluctuations in manufacturing equipment associated with different loads. Particularly described is a refrigerator having a reservoir from which the cooling fluid is pumped to the manufacturing equipment. The fluid return from the equipment to the cooled reservoir has two paths. There is a direct return path, and there is a path through a power-operated valve. An automatic controller senses temperature of cooling fluid returning from the processing equipment (load) and the temperature of cooling fluid at reservoir outlet to the pump intake. The controller processes the temperature information, and controls a conventional hot-gas by-pass valve of the refrigeration system and controls the powered valve as needed to establish and maintain the desired cooling fluid temperature, regardless of load. The heated cooling fluid is mixed with the cooling fluid in the reservoir which is part of the mechanical refrigeration system. If the cooling fluid returning from the processing equipment is cooler than desired, some of the flow of cooling fluid pumped from the reservoir is shunted past the load.

The Applicants respectfully point out that the disclosure of Oswalt, *et al.*,'998 is not related to the production of acrylic acid or acrolein or the gasification of liquefied propylene and/or propane.

Prior art described by the Applicants

The prior art related to the production of acrylic acid or acrolein employed steam (hot) for the purpose of gasifying liquefied propylene and/or propane. The condensed drain (cold liquid) of the steam resulting from the heat exchange was then used as the boiler feed water. Specification, page 3, line 19, *et seq.* In further contrast to the subject matter of the present invention, water employed to cool the apparatus in the prior art for the production of acrylic acid or acrolein has previously been supplied from a refrigerator and/or cooling tower. Specification, page 4, line 24, *et seq.* As mentioned *supra* the Applicants have found that by substituting liquid

for steam[3] (supplied as the heat source in the prior art for gasifying propylene in the propylene evaporator), it is now possible to allow the reactant gas to be supplied stably and, at the same time, enable the total system for producing acrylic acid to be stabilized drastically, reducing unwanted polymerization and subsequent clogging of the system. Moreover, the electric power required to operate the apparatus of the present invention is significantly reduced due to the chilling of the coolant during gasification.

It is axiomatic that a claimed invention is not obvious solely because it is composed of elements that are all individually found in the prior art. See, e.g., In re Rouffet, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457 (Fed. Cir. 1998). The Applicants respectfully point out here, however, that the elements are not even found in the cited prior art. Moreover, even if they were, the manifest defense against hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. In re Dance, 160 F.3d 1339, 1343, 48 USPQ2d 1635, 1637 (Fed. Cir. 1998). The need for specificity pervades this authority. See, e.g., In re Kotzab, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). Nevertheless, it is improper simply to "[use] that which the inventor taught against its teacher." W.L. Gore v. Garlock, Inc., 721 F.2d 1540, 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983).

The Applicants respectfully request the Examiner to withdraw the rejections under 35 USC §103(a).

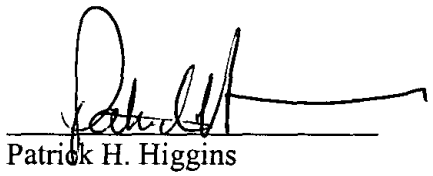
* * *

For all the foregoing reasons, the Applicants submit that Claims 8-13 are in condition for allowance. Early action toward this end is courteously solicited. *The Examiner is kindly encouraged to telephone the undersigned in order to expedite any detail of the prosecution.*

[3] With reference to FIG.1, it has been heretofore customary to supply steam 17 controlled by the pressure controller 24 to the evaporator 3 for the purpose of utilizing the high energy of the steam 17, thereby gasifying liquefied propylene.

The Commissioner is authorized to charge any deficiency or credit any overpayment in connection herewith to Deposit Account No. 13-2165.

Respectfully submitted,



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CLAIMS MARKED TO SHOW CHANGES

8. (Amended) An apparatus for [the production of] producing acrylic acid or acrolein, comprising:

a) an evaporator for gasifying liquefied propylene and/or propane,

b) means for [gasifying liquefied propylene and/or propane introduced into an evaporator by] supplying a liquid coolant to said evaporator, [and, at the same time, preparing a chilled]

c) means for chilling the coolant in the evaporator by recovering [the] latent heat of the liquefied propylene and/or propane,

d) means for subjecting [the] resultant gasified propylene and/or propane to a catalytic gas phase oxidation reaction thereby preparing a gas containing acrylic acid or acrolein, and

e) means for [using said chilled] circulating coolant [in] from the evaporator to heat exchangers attached to the apparatus [for the production of acrylic acid or acrolein].

9. (Amended) An apparatus according to claim 8, wherein said means for [preparing said chilled] chilling the coolant includes means for adjusting [the] a temperature of said liquid coolant or means for adjusting [the] a flow amount thereof.

10. (Amended) An apparatus according to claim 8, which further comprises means for circulating [the chilled] coolant used in said heat exchangers to [said] the means for [preparing said chilled] chilling the coolant.

11. (New) A method for producing acrylic acid or acrolein, comprising:
gasifying liquefied propylene and/or propane in an apparatus of claim 8.

12. (New) A method for producing acrylic acid or acrolein, comprising:
gasifying liquefied propylene and/or propane in an apparatus of claim 9.

13. (New) A method for producing acrylic acid or acrolein, comprising: gasifying liquefied propylene and/or propane in an apparatus of claim 10.

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